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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/664,446
Filing Date: September 18, 2003
Appellant(s): NISHINO ET AL.

Christopher P. Rauch
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 9/17/2008 appealing from the Office action mailed 3/31/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,432,585	Kawakami	8/2002
6,413,672	Suzuki	7/2002
6,171,725	Suzuki	1/2001
6,506,520	Inoue	1/2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-12 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Kawakami et al., US 6,432,585.

Kawakami teaches a battery comprising an anode, a cathode and an electrolyte. The anode comprises an anode structural body 10. The structural body comprises a host material 101 in an amount of 50 wt% of more. If the electrode structural body is used in a lithium battery, the host material comprises one or more elements selected from the group consisting of Si, Sn and In (11:1-18). When Si is used as the host material, Cu, Ni, Ag or Sn may partially cover the surface of the Si particles (11:30-67). Si may contain an impurity such as A1, Ca, Cr, Fe, Mg, Mn or Ni to decrease the electric resistance of the electrode material layer 102 (12:1-5). The layer 102 may comprise the host material 101 and an electrically conductive auxiliary in order to assist and increase the electron conduction among particles of the host material or that between the host material and the collector. It is preferred the electrically conductive auxiliary be contained in an amount of 1-30 wt%. The electrically conductive auxiliary may be a carbonaceous material such

as acetylene black, ketjen black or graphite. The electrically conductive auxiliary may be in a filament-like, fibrous or needle-like form. The host material and carbonaceous material are mechanically mixed using a ball mill or the like (compressive/shearing force) (12:46-13:9). See also column 19, line 50-column 20, line 23. See also Example 12.

Thus, the claims are anticipated. Kawakami does not explicitly state the host material and carbonaceous material are bonded by van der Waals forces. However, when the host material and carbon material are mechanically mixed using a ball mill or the like (compressive/shearing force), the host material and carbon material are inherently attracted by van der Waals forces (weak attractive forces acting between molecules; see Hawley's Condensed Chemical Dictionary, page 1217). In order for the carbon material to assist and increase the electron conduction among particles of the host material, the carbon material must be in contact with the host material.

Claims 1, 3-7 and 9-12 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Suzuki et al., US 6,413,672.

Suzuki teaches a lithium battery comprising an anode, a cathode and an electrolyte. The anode comprises an anode material containing 50-99 wt% of silicon and 1-50 wt% of carbon material (abstract). It is preferable that silicon exists in the form of particles and the particles are covered with the carbonaceous material. A material containing a high proportion of silicon provides a high capacity (2:52-67). An amount of 70 wt% or more of silicon is preferred (5:7-9). The carbonaceous material may be graphite, amorphous carbon (acetylene black) or a mixture thereof. For example, coke, natural graphite, artificial graphite, carbonized pitch or a mixture

thereof may be used (5:16-22). Embodiment 1 teaches 28.5 parts by weight silicon and 7 parts by weight graphite were mixed and then processed in a vibration mill (compressive/shearing).

Thus the claims are anticipated. The carbon covering material is inherently bonded to the silicon by van der Waals forces (weak attractive forces acting between molecules; see Hawley's Condensed Chemical Dictionary, page 1217) when the material is subjected to a vibration mill.

Claims 1, 4, 5, 7, 10 and 11 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Suzuki et al., US 6,171,725.

Suzuki teaches a battery comprising a positive electrode, a negative electrode and an electrolyte. The negative electrode includes a negative electrode material containing 30-90 wt% of silicon and 10-70 wt% of carbon (abstract). The carbon material may be cokes, graphite (artificial graphite) and the like (3:14-21). The silicon/carbon composite material preferably comprises 50-90 wt% silicon and 10-50 wt% carbon (3:22-63). Example 4 teaches silicon powder was mixed with graphite/pitch. After calcining, the solid material was roughly milled (compressed/sheared). Through dry milling, a silicon/carbon composite powder was obtained.

Thus the claims are anticipated. The teaching of a silicon/carbon composite material obtained by dry milling inherently teaches the limitation "physically bonded by van der Waals forces". The teaching of a composite material clearly indicates the silicon and carbon materials are bonded.

Claims 1-12 are rejected under 35 U.S.C. 102(e)/103(a) as being anticipated by Inoue et al., US 6,506,520.

Inoue teaches a negative electrode for a nonaqueous secondary battery comprising composite particles (abstract). The composite particles include a core phase A and an outer phase B. When phase A is Sn, phase B may be Sn-Fe, Sn-Zn, Sn-In or Sn-Pb. When phase A is Si, phase B may be Si-Co, Si-Ni, Si-Zn or Si-A1 (Table 1). A conductive material maybe contained in the negative electrode. Among conductive materials, synthetic (artificial) graphite, acetylene black and carbon fibers are especially favorable. The amount of conductive material in the negative electrode is preferably 1-30% of the negative electrode materials (composite particles) (5:50-6:3).

Thus the claims are anticipated. The claims are alternatively unpatentable because the courts have ruled that product-by-process limitations, in the absence of unexpected results are obvious. Inoue does not explicitly state a compressive and/or shearing force is applied to the negative electrode material, however, the negative electrode material of the claimed invention and the negative electrode of the prior art appear to be the same.

(10) Response to Argument

Appellant argues that claims 1 and 7 do not include product-by-process limitations. As noted by appellant, claims 1 and 7 each claim subject matter relating to a base material that is physically bonded by van der Waals forces to a carbonaceous material, wherein the physical bonding of the base material to the carbonaceous material is "effected by applying a compressive force and a shearing force to at least a part of a surface of a base material when the composite material is formed."

This argument is not persuasive. As noted in the response to arguments of the final rejection, the limitation "effected by applying a compressive force and a shearing force" describes a process. The claims are to a product. The method steps including applying a compressive force and a shearing force have been considered with regard to the *structure* of the product, but are not given patentable weight. Thus, a compressive force and a shearing force are not required in the prior art. The structure has been considered and is met by the prior art applied.

Appellant further argues that, "as described in Appellant's specification, Appellant's claimed composite material has distinctive structural characteristics imparted by the application of a compressive force and a shearing force at the time the composite material is formed. Appellant's claimed composite material exhibits improved cycle characteristics due to the application of a compressive force and a shearing force at the time the composite material is formed."

This argument is not persuasive. Appellant has not met the burden required to overcome the rejection by showing evidence of these claims, as compared with the *most pertinent prior art*. The claimed anode material must be shown to be materially different than the anode material of the applied prior art (MPEP 2113.) Applicant has not provided any evidence clearly showing the claimed material is materially different than the prior art material. Applicant's asserted unexpected results do not properly compare the claimed invention with the prior art of record, which is considered to be the most pertinent prior art. The prior art teaches applying forces to the materials forming the claimed product. The claimed material and the material of the prior art are the same. MPEP 2112 (examiner note 1.d.) states, "When the reference teaches a product

that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process is properly rejected as anticipated under 35 U.S.C. 102 or in the alternative as obvious under 35 U.S.C. 103(a).

Appellant further argues that, "the cited references suggest application of a compressive force and a shearing force to effect Appellant's claimed physical bonding." This argument is not persuasive. The mechanical mixing using a ball mill or the like of Kawakami results in compressive and shearing forces. The mixing in a vibration mill or roughly milling of Suzuki '672 or Suzuki '725 results in compressive and shearing forces. The Examiner points to Figure 1 of the present specification as an example of the claimed compressive/shearing forces. Figure 1 uses a compressing bar, while the prior art employs ball mill using compressing balls. Applicant concludes the compressing bar of Figure 1 results in compressive/shearing forces. The compressing balls of the prior art provide equivalent forces that result in the same compressive/shearing forces. For these reasons, the claims stand rejected for reasons of record.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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